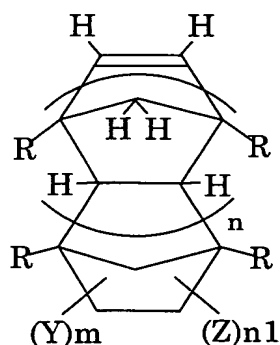
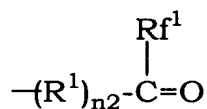


WHAT IS CLAIMED IS:

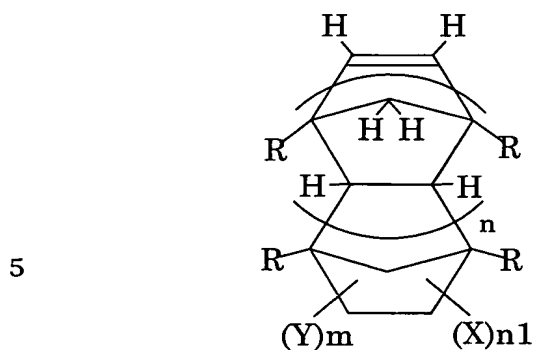
1. A process for preparing a fluorine-containing norbornene derivative having a fluorine-containing ketone structure which is represented by the formula (2):



wherein Z is the same or different and each is:



in which Rf¹ is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond, R¹ is a divalent organic group, n₂ is 0 or 1; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is an integer of from 1 to 5; n₁ is an integer of from 1 to 5; m + n₁ = 6, said process being characterized by reacting a norbornene derivative represented by the formula (1):



wherein X is the same or different and each is:



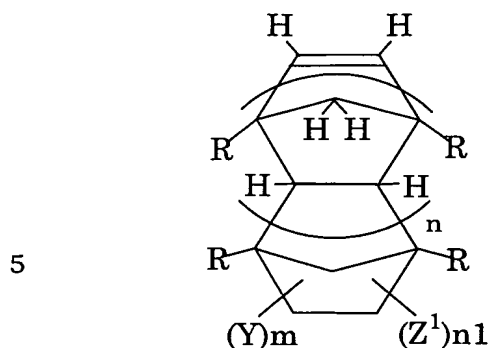
in which X^1 is $-\text{COOR}^2$ or:



in which R^2 is an alkyl group having 1 to 5 carbon atoms, X^2 is halogen atom; Y, R, R^1 , m, n, n1 and n2 are as defined above, with a fluoroalkylation agent which introduces Rf^1 to X in the formula (1).

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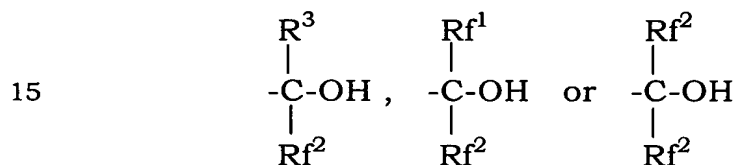
2. A process for preparing a fluorine-containing norbornene derivative having a fluorine-containing tertiary alcohol structure which is represented by the formula (4):



wherein Z^1 is the same or different and each is:

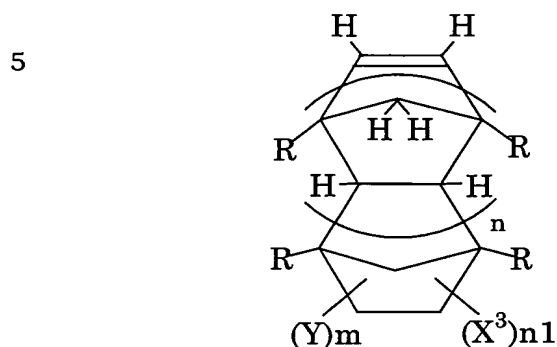


in which Z^2 is:

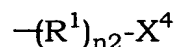


wherein Rf^1 is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond, Rf^2 is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond, R^3 is H or a hydrocarbon group having 1 to 10 carbon atoms, R^1 is a divalent organic group, $n2$ is 0 or 1; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an

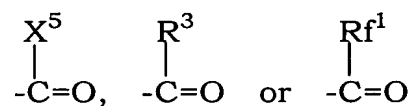
integer of from 1 to 5; m is an integer of from 1 to 5; n1 is an integer of from 1 to 5; m + n1 = 6, said process being characterized by reacting a norbornene derivative represented by the formula (3):



wherein X^3 is the same or different and each is:

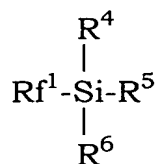


15 in which X^4 is $-\text{COOR}^2$,



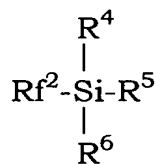
20 wherein R^2 is an alkyl group having 1 to 5 carbon atoms, X^5 is halogen atom; R^3 , R^f , R^1 , Y, R, m, n, n1 and n2 are as defined above, with a fluoroalkylation agent which introduces R^f to X^4 .

3. The preparation process of Claim 1, wherein the
25 fluoroalkylation agent is a fluorosilane compound represented by:



5 wherein Rf¹ is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; R⁴, R⁵ and R⁶ are the same or different and each is a hydrocarbon group having 1 to 10 carbon atoms.

10 4. The preparation process of Claim 2, wherein the fluoroalkylation agent is a fluorosilane compound represented by:

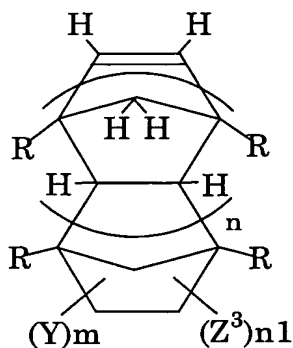


15

wherein Rf² is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; R⁴, R⁵ and R⁶ are the same or different and each
20 is a hydrocarbon group having 1 to 10 carbon atoms.

5. A norbornene derivative having a fluorine-containing ketone structure represented by the formula (5):

5



wherein Z^3 is the same or different and each is:

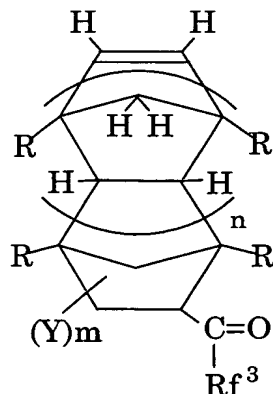
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in which Rf^3 is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is an integer of from 1 to 5; n1 is an integer of from 1 to 5; $m + n1 = 6$.

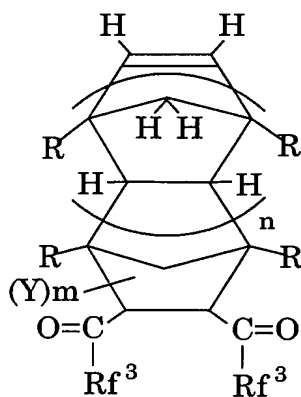
6. A norbornene derivative having a fluorine-containing ketone structure represented by the formula (6):

5



in which Rf^3 is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is 5, or the formula (7):

20



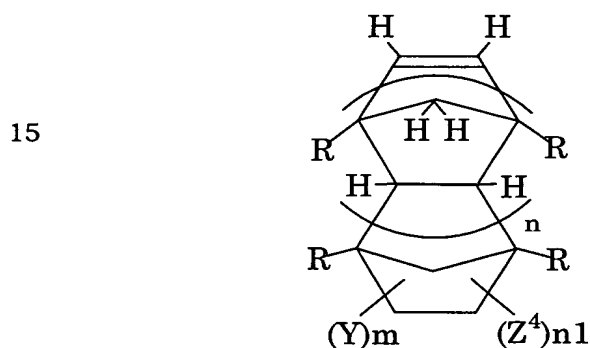
in which Rf^3 is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the

same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is 4.

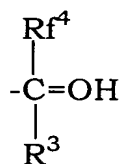
7. The norbornene derivative having a fluorine-containing ketone structure of Claim 5, wherein in the formula (5), Rf^3 is CF_3 .

8. The norbornene derivative having a fluorine-containing ketone structure of Claim 6, wherein in the formulae (6) and (7), Rf^3 is CF_3 .

9. A norbornene derivative having a fluorine-containing alcohol structure represented by the formula (8):



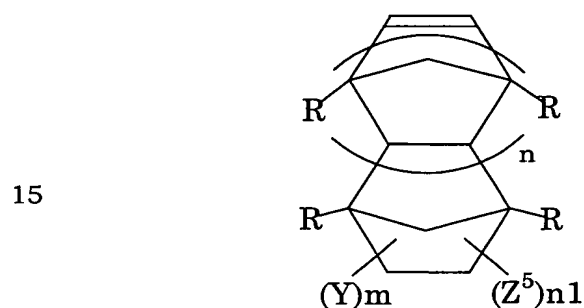
wherein Z^4 is the same or different and each is:



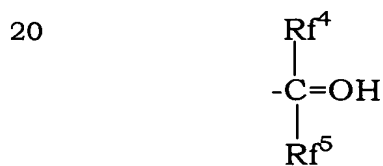
in which Rf^4 is the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl

group which has 1 to 10 carbon atoms and ether bond, R^3 is H or a hydrocarbon group having 1 to 10 carbon atoms; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is an integer of from 1 to 5; n_1 is an integer of from 1 to 5; $m + n_1 = 6$.

10. A norbornene derivative having a fluorine-containing alcohol structure represented by the formula (9):



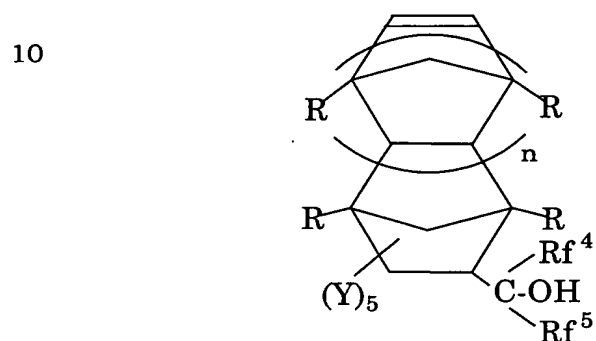
wherein Z^5 is the same or different and each is:



in which Rf^4 and Rf^5 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to

10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is an integer of from 1 to 5; n1 is an integer of
5 from 1 to 5; $m + n1 = 6$.

11. A norbornene derivative having a fluorine-containing alcohol structure represented by the formula (10):



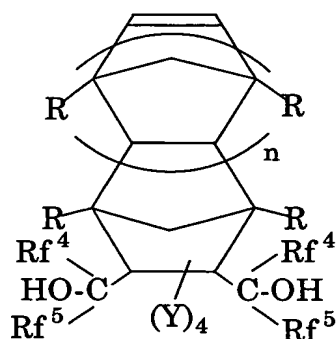
wherein Rf^4 and Rf^5 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to
20 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5.

25 12. The norbornene derivative having a fluorine-containing alcohol structure of Claim 10, wherein in the formula (9), at least one of the substituents Y is F or a fluorine-containing alkyl group which has 1

to 10 carbon atoms and may have ether bond.

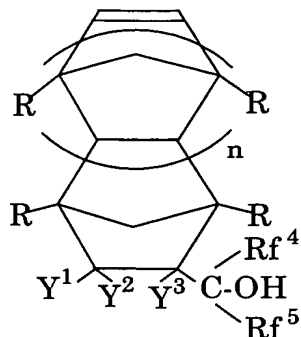
13. The norbornene derivative having a fluorine-containing alcohol structure of Claim 11, wherein in the formula (10), at least one of the substituents Y is F or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond.

14. A norbornene derivative having a fluorine-containing alcohol structure represented by the formula (11):



wherein Rf^4 and Rf^5 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y is the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5.

15. A norbornene derivative having a fluorine-containing alcohol structure represented by the formula (12):



5
10
15
wherein Rf^4 and Rf^5 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and ether bond; Y^1 , Y^2 and Y^3 are the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; at least one of Y^1 , Y^2 and Y^3 is F or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond.

16. The norbornene derivative having a fluorine-containing alcohol structure of Claim 15, wherein in the formula (12), Y^1 and Y^2 are H and Y^3 is F or CF_3 .

17. The norbornene derivative having a fluorine-containing alcohol structure of Claim 15, wherein in the formula (12), Y^1 and Y^2 are F and Y^3 is F or CF_3 .

25

18. The norbornene derivative having a fluorine-containing alcohol structure of Claim 9, wherein Rf^4 and Rf^5 are CF_3 .

19. The norbornene derivative having a fluorine-containing alcohol structure of Claim 10, wherein Rf^4 and Rf^5 are CF_3 .

20. The norbornene derivative having a fluorine-containing
5 alcohol structure of Claim 11, wherein Rf^4 and Rf^5 are CF_3 .

21. The norbornene derivative having a fluorine-containing alcohol structure of Claim 14, wherein Rf^4 and Rf^5 are CF_3 .

10 22. The norbornene derivative having a fluorine-containing alcohol structure of Claim 15, wherein Rf^4 and Rf^5 are CF_3 .

23. The norbornene derivative having a fluorine-containing alcohol structure of Claim 9 which has a protective acid-reactive
15 functional group $-OQ^1$ protecting hydroxyl.

24. The norbornene derivative having a fluorine-containing alcohol structure of Claim 10 which has a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl.

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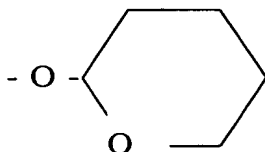
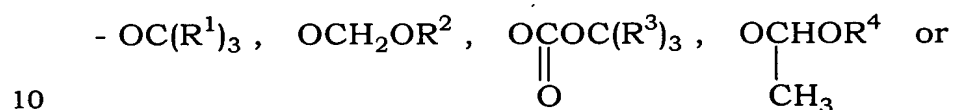
25. The norbornene derivative having a fluorine-containing alcohol structure of Claim 11 which has a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl.

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26. The norbornene derivative having a fluorine-containing alcohol structure of Claim 14 which has a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl.

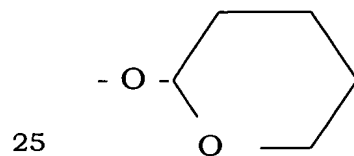
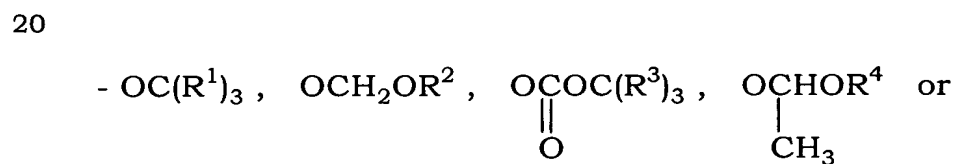
27. The norbornene derivative having a fluorine-containing alcohol structure of Claim 15 which has a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl.

5 28. The norbornene derivative of Claim 23, wherein the protective acid-reactive functional group $-OQ^1$ is at least one selected from the group consisting of:



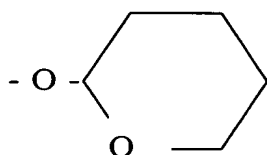
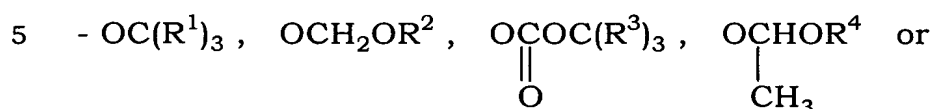
15 wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

29. The norbornene derivative of Claim 24, wherein the protective acid-reactive functional group $-OQ^1$ is at least one selected from the group consisting of:



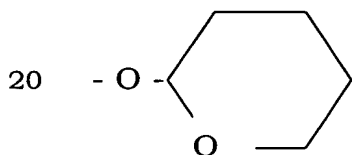
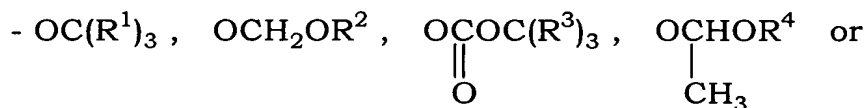
wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

30. The norbornene derivative of Claim 25, wherein the protective acid-reactive functional group $-OQ^1$ is at least one selected from the group consisting of:



wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

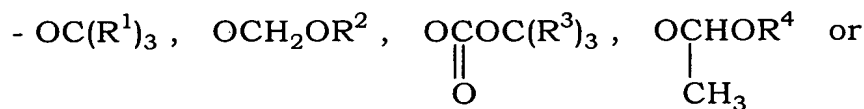
31. The norbornene derivative of Claim 26, wherein the protective acid-reactive functional group $-OQ^1$ is at least one selected from the group consisting of:



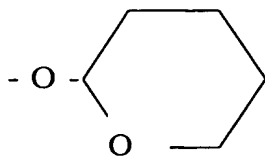
wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

32. The norbornene derivative of Claim 27, wherein the protective acid-reactive functional group $-OQ^1$ is at least one selected from the group consisting of:

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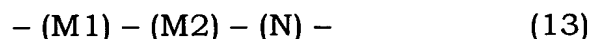


5



wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

33. A fluorine-containing polymer having a number average molecular weight of from 500 to 1,000,000 which has a ring structure in the polymer trunk chain and is represented by the formula (13):



wherein M1 is a structural unit derived from at least one selected from the fluorine-containing norbornene derivatives represented by the formulae (5) to (12); M2 is a structural unit obtained from a fluorine-containing ethylenic monomer having 2 or 3 carbon atoms and at least one fluorine atom; N is a structural unit derived from monomer copolymerizable with the structural units M1 and M2, and the structural units M1, M2 and N are contained in amounts of from 1 to 99 % by mole, from 1 to 99 % by mole and from 0 to 98 % by mole, respectively.

34. The fluorine-containing polymer of Claim 33, wherein in the formula (13), provided that $(\text{M1}) + (\text{M2})$ is 100 % by mole, a percent by mole ratio of M1/M2 is 30/70 to 70/30.

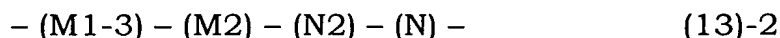
wherein

M1-2 is a structural unit derived from the norbornene derivatives having a fluorine-containing alcohol structure which are represented by the formulae (8) to (12) and have a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl thereof;

15 M2 and N are as defined in the formula (13),
provided that (M1-1) + (M1-2) + M2 is 100 % by mole, a percent by mole
ratio of ((M1-1) + (M1-2))/M2 is 30/70 to 70/30, and
the structural units M1-1, M1-2, M2 and N are contained in amounts of
from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole
20 and from 0 to 97 % by mole, respectively.

36. The fluorine-containing polymer of Claim 35, wherein provided that (M1-1) + (M1-2) is 100 % by mole, a percent by mole ratio of (M1-1)/(M1-2) is 90/10 to 50/50.

37. A fluorine-containing polymer represented by the formula (13)-2:



wherein the structural unit M2 is as defined in the formula (13),
the structural unit M1-3 is a structural unit derived from at least one
5 selected from the norbornene derivatives represented by the formulae (8)
to (12),
the structural unit N2 is a structural unit derived from a cyclic aliphatic
unsaturated hydrocarbon which is copolymerizable with monomers
constituting the structural units M1-3, M2 and N and has COOH group
10 or an acid-labile functional group which can be converted to carboxyl
due to action of an acid,
the structural unit N is a structural unit derived from monomer
copolymerizable with monomers constituting the structural units M1-3,
M2 and N2,
15 provided that (M1-3) + M2 + N2 is 100 % by mole, a percent by mole ratio
of ((M1-3) + N2)/M2 is 70/30 to 30/70, and
the structural unit M1-3, M2, N2 and N are contained in amounts of
from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole
and from 0 to 97 % by mole, respectively.

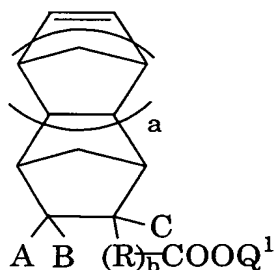
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38. The fluorine-containing polymer of Claim 37, wherein in
the fluorine-containing polymer of the formula (13)-2, the structural
unit N2 is a structural unit derived from norbornene derivative having
COOH group or an acid-labile functional group which can be converted
25 to carboxyl due to action of an acid.

39. The fluorine-containing polymer of Claim 38, wherein the

norbornene derivative having COOH group or an acid-labile functional group which can be converted to carboxyl due to action of an acid is represented by the formula:

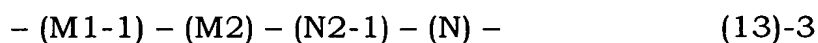
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wherein A, B and C are H, F, alkyl groups having 1 to 10 carbon atoms or
 10 fluorine-containing alkyl groups having 1 to 10 carbon atoms, R is a
 divalent hydrocarbon group having 1 to 20 carbon atoms, a fluorine-
 containing alkylene group having 1 to 20 carbon atoms or a fluorine-
 containing alkylene group having 2 to 100 carbon atoms and ether bond,
 a is 0 or an integer of from 1 to 3, b is 0 or 1, COOQ¹ is COOH group or
 15 an acid-labile functional group which can be converted to carboxyl due
 to action of an acid, provided that b is 0 or R does not have fluorine atom,
 any one of A, B and C is fluorine atom or a fluorine-containing alkyl
 group.

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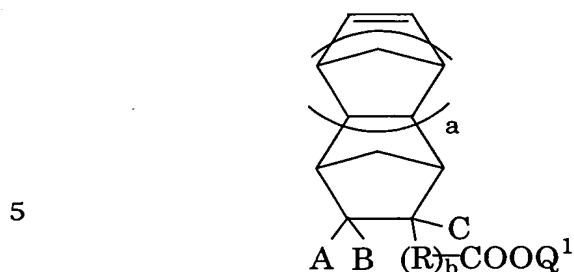
40. A fluorine-containing polymer represented by the formula
 (13)-3:



25

wherein the structural unit M1-1 and M2 are as defined in the formula
 (13)-1 of Claim 35,
 the structural unit N2-1 is a structural unit derived from norbornene

derivatives represented by the formula (3)-1:



wherein COOQ¹ is an acid-labile functional group which can be converted to carboxyl due to action of an acid, A, B, C, R, a and b are as defined above.

10 the structural unit N is a structural unit derived from monomer copolymerizable with monomers constituting the structural units M1-1, M2 and N2-1,

provided that (M1-1) + (M2) + (N2-1) is 100 % by mole, a percent by mole ratio of ((M1-1) + (N2-1))/(M2) is 70/30 to 30/70, and provided that
15 (M1-1) + (N2-1) is 100 % by mole, a percent by mole ratio of (M1-1)/(N2-1) is 95/5 to 50/50, and

the structural unit M1-1, M2, N2-1 and N are contained in amounts of from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole and from 0 to 97 % by mole, respectively.

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41. The fluorine-containing polymer of Claim 33, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

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42. The fluorine-containing polymer of Claim 35, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

43. The fluorine-containing polymer of Claim 37, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

5 44. The fluorine-containing polymer of Claim 40, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

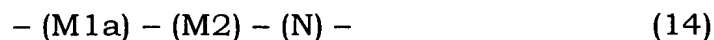
 45. A chemically amplifying type photoresist composition
10 which comprises:

(A) a fluorine-containing polymer having OH group and/or a group comprising a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl thereof,

(B) a photoacid generator, and

15 (C) a solvent,

in which the fluorine-containing polymer (A) having an acid-reactive group is a fluorine-containing polymer represented by the formula (14):



20

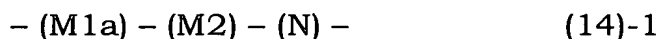
wherein M1a is a structural unit derived from the norbornene derivatives of the formulae (8) to (12) having a fluorine-containing alcohol structure and/or the norbornene derivatives having a fluorine-containing alcohol structure which are represented by the formulae (8)
25 to (12) and have a protective acid-reactive functional group $-OQ^1$ protecting hydroxyl thereof; M2 is a structural unit obtained from a fluorine-containing ethylenic monomer having 2 or 3 carbon atoms and

at least one fluorine atom; N is a structural unit derived from monomer copolymerizable with the structural units M1a and M2.

46. The chemically amplifying type photoresist composition
5 of Claim 45 comprising:

- (A) a fluorine-containing polymer having OH group or a group which can be dissociated by an acid and converted to OH group,
- (B) a photoacid generator, and
- (C) a solvent,

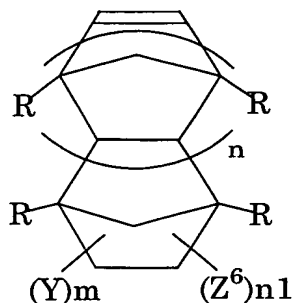
10 in which the fluorine-containing polymer (A) is a fluorine-containing polymer having a number average molecular weight of from 500 to 1,000,000 and represented by the formula (14)-1:



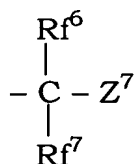
15

wherein the structural unit M1a is a structural unit derived from at least one selected from norbornene derivatives having a fluorine-containing alcohol structure represented by the formula (15):

20



25 in which Z⁶ is the same or different and each is:



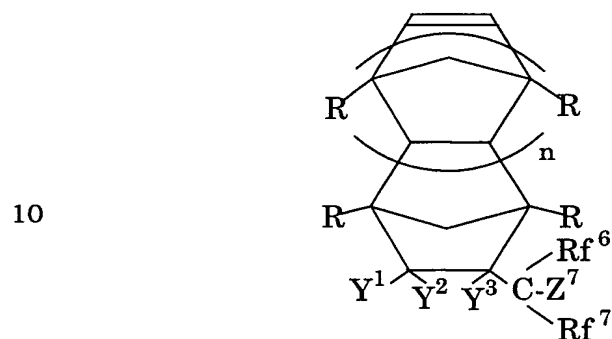
- 5 wherein Rf^6 and Rf^7 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group having 1 to 10 carbon atoms and ether bond; Z^7 is OH group or a group dissociated due to action of an acid and converted to OH group; Y is the same or different and each is H, F, Cl, an
- 10 alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5; m is an integer of from 1 to 5; n1 is an integer of from 1 to 5; $m + n1 = 6$,
- 15 the structural unit M2 is a structural unit derived from an ethylenic monomer having 2 or 3 carbon atoms and at least one fluorine atom, the structural unit N is a structural unit derived from monomer copolymerizable with the structural units M1a and M2, and provided that M1a + M2 is 100 % by mole, a percent by mole ratio of
- 20 M1a/M2 is 1/99 to 70/30, and the structural units M1a, M2 and N are contained in amounts of from 1 to 99 % by mole, from 1 to 99 % by mole and from 0 to 98 % by mole, respectively.

47. The chemically amplifying type photoresist composition

25 of Claim 46, wherein in the structural unit M1a of the fluorine-containing polymer (A), at least one of the substituents Y in the formula (15) is F or a fluorine-containing alkyl group which has 1 to 10 carbon

atoms and may have ether bond.

48. The chemically amplifying type photoresist composition of Claim 46, wherein in the fluorine-containing polymer (A), the structural unit M1a is a structural unit derived from fluorine-containing norbornene derivatives represented by the formula (16):



wherein Rf^6 and Rf^7 are the same or different and each is a fluorine-containing alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group having 1 to 10 carbon atoms and ether bond; Z^7 is OH group or a group dissociated due to action of an acid and converted to OH group; Y^1 , Y^2 and Y^3 are the same or different and each is H, F, Cl, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group which has 1 to 10 carbon atoms and may have ether bond; R is the same or different and each is H or an alkyl group having 1 to 10 carbon atoms; n is 0 or an integer of from 1 to 5.

49. The chemically amplifying type photoresist composition of Claim 48, wherein in the structural unit M1a of the fluorine-containing polymer (A), Y^1 and Y^2 in the formula (16) are F and Y^3 is F or CF_3 .

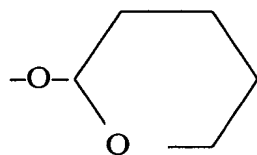
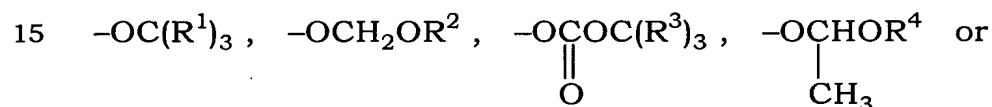
50. The chemically amplifying type photoresist composition of Claim 48, wherein in the structural unit M1a of the fluorine-containing polymer (A), Y^1 and Y^2 in the formula (16) are F and Y^3 is F or CF_3 .

5

51. The chemically amplifying type photoresist composition of Claims 48, wherein in the structural unit M1a of the fluorine-containing polymer (A), Rf^6 and Rf^7 in the formula (16) are CF_3 .

10

52. The chemically amplifying type photoresist composition of Claims 46, wherein in the structural unit M1a of the fluorine-containing polymer (A), the group Z^7 which is dissociated due to action of an acid and converted to OH group is a group represented by:



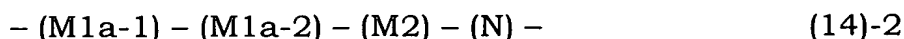
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wherein R^1 , R^2 , R^3 and R^4 are alkyl groups having 1 to 5 carbon atoms.

25

53. The chemically amplifying type photoresist composition of Claims 46, wherein the structural unit M2 of the fluorine-containing polymer (A) is a structural unit obtained from at least one monomer selected from the group consisting of tetrafluoroethylene and chlorotrifluoroethylene.

54. The chemically amplifying type photoresist composition of Claim 29, wherein said fluorine-containing polymer (A) is a fluorine-containing polymer having a number average molecular weight of from 500 to 1,000,000 which has a ring structure in the polymer trunk chain
5 and is represented by the formula (14)-2:

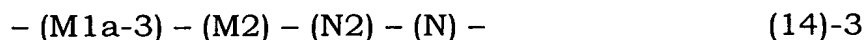


wherein the structural unit M1a-1 is a structural unit derived from at
10 least one selected from the norbornene derivatives having a fluorine-containing alcohol structure represented by the formula (8) to (12);
the structural unit M1a-2 is a structural unit derived from the norbornene derivatives having a fluorine-containing alcohol structure which are represented by the formulae (8) to (12) and have a protective
15 acid-reactive functional group $-OQ^1$ protecting hydroxyl thereof;
the structural units M2 and N are as defined in the formula (14),
provided that $(M1a-1) + (M1a-2) + M2$ is 100 % by mole, a percent by mole ratio of $((M1a-1) + (M1a-2))/M2$ is 30/70 to 70/30, and
the structural units M1a-1, M1a-2, M2 and N are contained in amounts
20 of from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole and from 0 to 97 % by mole, respectively.

55. The chemically amplifying type photoresist composition of Claim 54, wherein provided that $(M1a-1) + (M1a-2)$ is 100 % by mole, a
25 percent by mole ratio of $(M1a-1)/(M1a-2)$ is 90/10 to 50/50.

56. The chemically amplifying type photoresist composition

of Claim 29, wherein said fluorine-containing polymer (A) is a fluorine-containing polymer represented by:



5

wherein the structural unit M2 is as defined in the formula (14),
the structural unit M1a-3 is a structural unit derived from at least one selected from the norbornene derivatives represented by the formulae (8) to (12),

10 the structural unit N2 is a structural unit derived from a cyclic unsaturated aliphatic hydrocarbon which is copolymerizable with monomers constituting the structural units M1-3, M2 and N and has COOH group or an acid-labile functional group which can be converted to carboxyl due to action of an acid,

15 the structural unit N is a structural unit derived from monomer copolymerizable with monomers constituting the structural units M1a-3, M2 and N2,

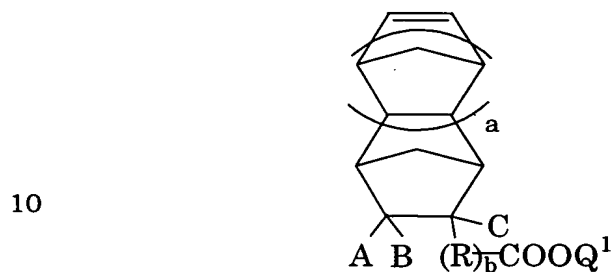
provided that $(M1a-3) + M2 + N2$ is 100 % by mole, a percent by mole ratio of $((M1a-3) + N2)/M2$ is 70/30 to 30/70, and

20 the structural units M1a-3, M2, N2 and N are contained in amounts of from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole and from 0 to 97 % by mole, respectively.

57. The chemically amplifying type photoresist composition
25 of Claim 56, wherein in the fluorine-containing polymer of the formula (14)-3, the structural unit N2 is a structural unit derived from a norbornene derivative having COOH group or an acid-labile functional

group which can be converted to carboxyl due to action of an acid.

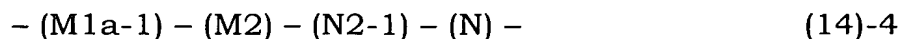
58. The chemically amplifying type photoresist composition of Claim 57, wherein said norbornene derivative having COOH group or an acid-labile functional group which can be converted to carboxyl due to action of an acid is represented by the formula:



wherein A, B and C are H, F, an alkyl group having 1 to 10 carbon atoms or a fluorine-containing alkyl group having 1 to 10 carbon atoms; R is a divalent hydrocarbon having 1 to 20 carbon atoms, a fluorine-containing alkylene group having 1 to 20 carbon atoms or a fluorine-containing alkylene group having 2 to 100 carbon atoms and ether bond; a is 0 or an integer of from 1 to 3; b is 0 or 1; COOQ¹ is COOH group or an acid-labile functional group which can be converted to carboxyl by an acid; when b is 0 or R does not have fluorine atom, any one of A to C is fluorine atom or a fluorine-containing alkyl group.

59. The chemically amplifying type photoresist composition of Claim 45, wherein said fluorine-containing polymer (A) is a fluorine-containing polymer represented by:

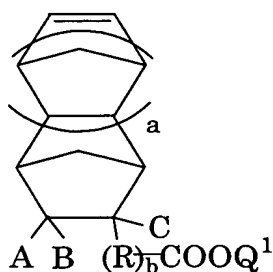
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wherein the structural unit M1a-1 and M2 are as defined in the formula (14)-2 of Claim 54,

the structural unit N2-1 is a structural unit derived from norbornene derivatives represented by the formula:

5



10 wherein COOQ^1 is an acid-labile functional group which can be converted to carboxyl by an acid; A, B, C, R, a and b are as defined above,

the structural unit N is a structural unit derived from monomer copolymerizable with monomers constituting the structural units M1a-1, M2 and N2-1,

15 provided that $(\text{M1a-1}) + (\text{M2}) + (\text{N2-1})$ is 100 % by mole, a percent by mole ratio of $((\text{M1a-1}) + (\text{N2-1})) / (\text{M2})$ is 70/30 to 30/70, and provided that $(\text{M1a-1}) + (\text{N2-1})$ is 100 % by mole, a percent by mole ratio of $(\text{M1a-1}) / (\text{N2-1})$ is 95/5 to 50/50, and

20 the structural units M1a-1, M2, N2-1 and N are contained in amounts of from 1 to 98 % by mole, from 1 to 98 % by mole, from 1 to 98 % by mole and from 0 to 97 % by mole, respectively.

60. The chemically amplifying type photoresist composition
25 of Claim 54, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

61. The chemically amplifying type photoresist composition of Claim 56, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.

5 62. The chemically amplifying type photoresist composition of Claim 59, wherein the structural unit M2 is a structural unit obtained from tetrafluoroethylene or chlorotrifluoroethylene.